



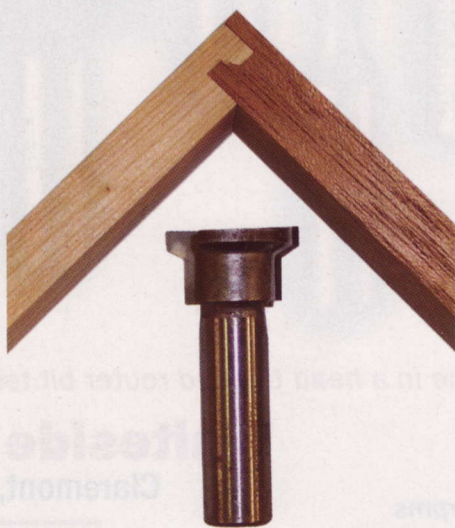
## LOCK-IT SCIENCE

*While using router bits to form moldings and edge profiles is commonplace, they can also be used for joinery. These specialized bits not only create tight joints, but have the capability of locking corner joints together for rock-solid construction.*

**By Ralph Bagnall**

I REGULARLY USE LOCK-MITER BITS and drawer-lock bits in my work. They are highly useful, but many woodworkers avoid them because they can be difficult to set up and adjust. Even with dedicated set-up blocks, any variation in the thickness of the stock requires some adjustment of the settings. With experience, these bits can be set up in about five minutes, using just a few test cuts. The secret is in knowing how to “read” the cuts and make the proper corrections.

Both of these bits operate in the same manner. One router table setup cuts both mating faces of the joint, with one cut with the workpiece facedown on the table and the other cut with the workpiece face against the fence. This arrangement means that the stock thickness affects both the bit height and the fence depth. It is critical that all of the stock is milled at the same time and with the same setup, to insure that all the parts are exactly the same thickness. With both bits you’ll also want to prepare a few extra sacrificial pieces of your stock to use for test cuts.



### **DRAWER-LOCK BIT**

The drawer lock bit is a great way to make drawer boxes. The shape of the bit creates a modified tongue and groove that seats the parts, and resists the failure often seen in butt-jointed drawer boxes. It is a modern joint, so it’s unsuited to furniture reproductions or high-end projects, but for many projects – especially production-run jobs and kitchens – it’s a quick and reliable joint.

For the initial setup, I set the bit height visually so that the bit leaves a shoulder at the top of the part (**Fig. 1**). The shoulder hides the joint from the front, leaving a smooth profile. I prefer a shoulder of about  $\frac{1}{8}$ " to minimize the look of the joint from the side, but this can increase with the thickness of the part.

Since the cuts are cross-grain on the ends of the parts, a miter gauge or sled is needed to support the part during the cut. If you use the miter gauge, be sure that the fence is parallel with the miter slot and that the miter gauge is at right angles to the fence. Use a backer board to prevent tearout. Cut one test part flat on the table (**Fig. 2**), and the second on end against the fence (**Fig. 3**).

Now fit the two parts together. This is where "reading" the fit comes in. A correct setup will yield a snug fit, flush edges and no gaps. If the tongues are too thick to fit the grooves, the bit is set too high (**Fig. 4**). If the tongues are small, the bit is set low (**Fig. 5**). If the lip isn't flush with the second piece it means that the fence is either set too deep (**Fig. 6**), or too shallow (**Fig. 7**).

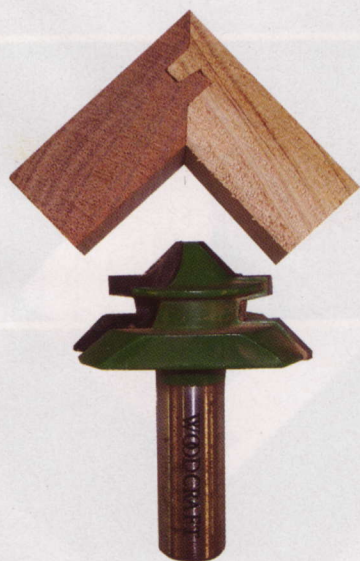
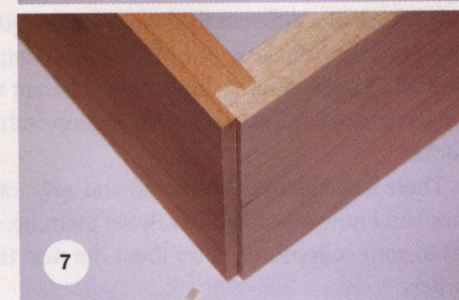
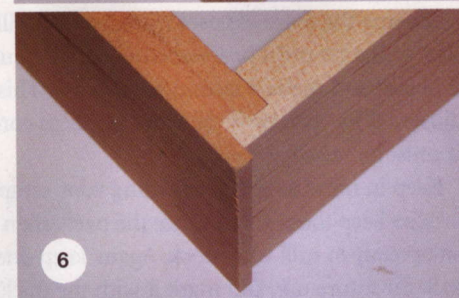
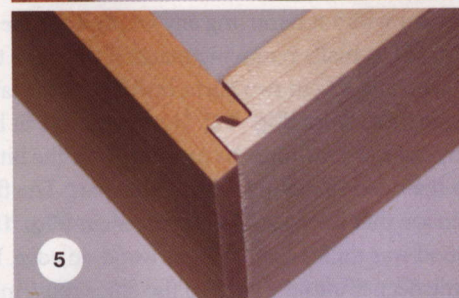
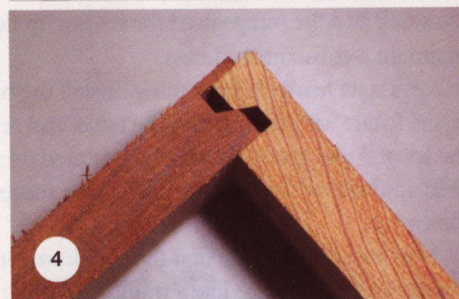
With the test cut showing the way, adjustments can be made and another test cut performed. With a little practice, you should be able to get the setup right in just a few tries. Once you have the cut right, save one of the test pieces, and mark it. This can serve as your set-up block for the next time you make the same joint in similar stock. It probably won't get you right there on the first try, but you'll be very close.

With the setup correct, you can now cut the parts to length. The front and back will be the full width of the drawer, and the sides will be the overall drawer length minus the shoulders. When I make drawers with this bit, I like to make all four pieces with it, and trap the drawer bottom inside, but you don't have to. You can use this bit for the front joints only, and add the bottom and back in a more traditional manner. The parts can now be cut to final length and milled on the router table.

## LOCK-MITER BIT

The lock-miter joint is a fast and easy way to create mitered corners. I've used them to create newels, corner trim, arbor posts and a dozen other things. Unlike a traditional miter joint, the tongue-and-groove joint that gives the lock miter its name keeps the joint from sliding when clamped. The parts tend to self-square, and the additional glue surface makes the joint exceptionally strong.

As useful as this bit is, its complex setup process frustrates many first time users. Like the drawer-lock bit, both halves of the joint are milled on the same table setup – one facedown on the table, and the other on edge against the fence. Typically, this means that any adjustments to the setup must involve both bit height and fence depth at the same time. Obviously, this compli-



cates the adjustments quite a bit. Special set-up blocks are available that will get you close, but the right setup is strictly based on the actual thickness of the workpieces you're using. Even a small variation in the part thickness means an adjustment to the setup. For good results, all of the stock and the scraps used for setting up need to be milled as a group to maintain a constant thickness.

Let's start from the beginning. Install the bit, and set the height and the fence. I start with the part on the table, and set the bit so that the center of the tongue and groove is visually centered on the part (**Fig. 8**). The fence is then adjusted so that the top of the part meets the top of the exposed part of the cutter.

Now test the cut. The first thing to look for is that the part is cut right to the top of the edge just like a traditional miter cut. The cut should come to a point without removing any width from the part. Here, the cut is too deep (**Fig. 9**), actually removing material from the top of the workpiece. Once this is correctly set cut two parts, one flat on the table (**Fig. 10**), and one on edge against the fence (**Fig. 11**). Now check the fit between the two. From here, any adjustments must be made to both the bit height and the fence position to maintain that sharp edge on the part. The first cut is pretty close, but you can see that the edges don't quite align (**Fig. 12**). In these photos, the dark wood was milled flat, the light wood on edge. Here, the bit needs to cut a little deeper into the part, so the fence must move back.

Moving the fence exposes more bit and will cut into the sharp edge of the joint, so the bit must be lowered as well. I adjusted the fence position and bit height and made a second set of parts. This second cut shows that I over-adjusted (**Fig. 13**). Now the fence needs to come back toward the bit and the bit must be raised as well.

Keep in mind as you're adjusting your setup that the changes affect both parts, so keep them small. Once the parts align correctly, as in **Fig. 14**, you're ready to mill your stock. Again, keep one of the test pieces as a set-up block for future use, and mark it with the thickness. If you use the bit again with a stock of a different thickness, you'll need to start from scratch like we have done here and keep one of those test scraps as a set-up block for this thickness. (Depending on how many different thickness of stock you use in mitered applications, you could end up with quite a collection of set-up blocks.)

These lock bits constitute a fast and easy way to improve your joinery once you know how to efficiently set them up. I hope you'll add these useful bits to your collection and try them out next time you need quick, strong corners.

— *Ralph Bagnall has been woodworking professionally for 20 years. Bagnall builds reproduction furniture in his home shop, and has been teaching and writing for the past several years. He has recently relocated from New Hampshire to the island of St. Croix, Virgin Islands, to pursue his woodworking in tropical sunshine.*

